

HOW HAS THE PIANOFORTE  
AS AN INSTRUMENT  
DEVELOPED SINCE  
1876

?

WITH SOME FIGURES

*AN ADDRESS*  
BY  
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# HOW HAS THE PIANOFORTE AS AN INSTRUMENT DEVELOPED SINCE 1876?—WITH SOME FIGURES

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BOSTON

**I**N the year 1892 it chanced to be my good fortune to attend the meetings of the Music Teachers' National Association. The meetings were held at the time, as they are held again this year, in Cleveland. But that was thirty-six years ago. During the intervening period I have frequently recalled to mind the delightful hours which were formerly granted me, and it is a pleasure to me to be present now on a similar occasion. The musicians I met, the recitals I attended, the papers I listened to; all these have been a source of rejuvenating reminiscence throughout the years, although—and alas—I sometimes wonder if this can be at all due to the facts that I was then a young man and that the Association was at the bewitching age of "sweet sixteen"!

But be that as it may, implacable years have since run their course and your Association has now reached the age of fifty-two; a number of years, be it noted, representing nearly one-fourth of the period which has elapsed since the pianoforte, as an instrument, was introduced. For it was in 1709 that Bartolomeo Christofori exhibited one or more harpsichords equipped with a hammer-action—a distinguishing feature of the pianoforte, as such; and it was two years later, in 1711, that he secured letters-patent for his invention, in which he included certain essential parts of the action as we know and use it today.

And if a disparity in the ages of the two is thus apparent, who shall deny a striking similarity between the underlying purposes of both? To further the cause of music; to develop a more and more comprehensive understanding and appreciation of music—the best in music; to be the means of extending a wider knowledge regarding the sublimest of the arts; to render happiness not alone unto one's self but unto countless others as well. Are not such among the motives which actuate the high-purposed teacher as they once actuated the ingenious Italian inventor? There exist, to be sure, utilitarian motives as well; but, if based upon integrity of purpose, need the two in any wise conflict? On the con-

trary, their interdependence is obvious. The one is aided by the other, each is the other's complement, while together they form a forceful, efficient whole or unity.

And then, too, what shall we say of the present-day pianoforte maker? Is he also actuated by idealistic as well as by utilitarian motives? The answer, happily enough, is not far to seek. Examine his product—that tells the tale, as no words can, for “By their fruits ye shall know them,” stands forever true.

The teacher of music, then, and the maker of the most essential means of teaching, namely, the pianoforte, are closely related. So, too, the composer, or creator of music, and the virtuoso or composer's interpreter, he who brings to performance and hearing that which the composer has conceived and to which he has given the written sign. And in short, since the pianoforte is and for many years has been the musical instrument universal, the composer, the performer, the teacher and the manufacturer must needs work hand in hand, bound by a close tie, fellow agents of a common cause—the progress and the promulgation not alone of pianoforte music but to a considerable extent, also, of music in general. As the skill in performance has developed throughout the centuries so have increased the demands made upon the instrument; as the maker in turn has through diligent and unflagging research expanded the scope of the pianoforte, so has the technique of the performer expanded and broadened.

“There is little doubt in my mind,” writes the late Henry E. Krehbiel, “that the emotionalism which strove against aesthetic conservatism from the earliest times down to Beethoven exerted a steady pressure along the line which has ended in the stupendous instrument and the Samsonian players of today.” Stupendous and Samsonian, true enough; but equally true, we hasten to add, the infinitely sensitive and delicate. For are not both player and instrument of modern times—at their best—capable of producing not only mountain-like chords of majestic grandeur but surpassing effects as well of gossamer grace and airiness; the ethereal effluence of a Chopin melody, the confiding tenderness or the romantic charm of a Schumann, the serene repose and religious emotion of a César Franck?

In the instrument as we know it, lie reflected the combined contributions of maker, composer, virtuoso, and teacher; contributions emanating from generations of men, years of ceaseless striving, tireless investigation in many fields of science; the realization of imaginative, poetic dreaming, the outcome of a long and ever-progressive process of evolution. To us is given the oak; Christofori, in 1709, knew but the acorn.

Robert Louis Stevenson somewhere suggests that the joy of the traveler is to be found not merely in arriving at his destination but in the journeying as well toward that destination. And while to us the modern instrument may yield unbounded joy and stimulus, many there were throughout the years running far, far back to remote civilizations who realized their urge and their joy, too, in the journey marking the evolution of the stringed-instrument family—a journey whose destination, so to speak, is the present-day pianoforte. Here the strings are neither rubbed nor plucked, as were those of the pianoforte's inter-related precursors, but set in vibration by hammer blows, blows wondrously under the control of the player by means of the intricate mechanism known as the action, while the action in turn is under the control of a keyboard.

Broadly speaking, it was about the year 1800 that the pianoforte superseded various and less sonorous keyboard instruments; the harpsichord, for instance, the clavichord and the spinet; from these it materially differed, to be sure, as to construction and tone, but from these, nevertheless, it was evolved.

Half a century or more later an important structural feature was introduced, based upon the invention, however, in 1843, of the full metal plate made in one solid casting. In accordance with scientific principles which for years had busied men's minds and which previously, tentatively though it was, had been called into play in the clavichords of the eighteenth century, a distinct advance now took place in the year 1859. This advance embodied a combination of the overstrung scale, so-called, with the metal plate, and thus was solved the problem occasioned by a demand for greater string tension; and this form of construction, by making possible a greater dynamic or tonal volume than had

previously existed, marked a definite progressive step in the development of the instrument. It is still regarded, so far as the point at issue is concerned, as the standardized method of procedure. It marked an epoch along the road of evolution, just as in 1821 the introduction of the double escapement or repetition action marked an epoch. But while its importance is universally recognized, one hesitates to assert that a finality has even yet been attained. For, unlike Miss Havisham's time-pieces in *Great Expectations*, which stopped at twenty minutes of nine never to go again, the course of evolution is characterized by a restless progressiveness, by a searching endless activity.

As a result of this spirit of activity, manifold and novel appurtenances appear with remarkable frequency, also devices of utility and adornment; a glance at the list of patents, in fact, granted during the last fifty years is dazzling, to say the least. But in reviewing the history of the pianoforte's growth we perforce come upon ghostly reminders that many of such innovations, for one reason or another, have been but short-lived at best, and we realize anew that while evolution's habit is indeed one of endless activity, its periods of efflorescence are neither slight nor premature.

It is to be said, then, that as to its basic or fundamental factors the pianoforte, as such, had been carried to a relatively high state of development not only as early as 1876, but as a matter of fact, as early as a decade or so prior to that date. That which has since been accomplished is largely the result of a fuller and more intelligent understanding of the scientific and mechanical principles involved.

In order that we may more clearly comprehend the importance of that which has been accomplished in more recent years, it may be well at this point to briefly enumerate the basic elements or parts constituting the typically fine pianoforte.

First, the case, consisting of the sides and ends, or rather the rims, as they are technically called; while within the rims (of which there are two, an outer and an inner), supporting and holding them in place, are posts or beams of heavy timber. These posts, together with the inner rim, form the frame, or skeleton, of the

instrument. To this frame, at its front end, is attached the wrest-plank or pin-block, into which the tuning-pins are driven. Over the framework as a whole is laid the sounding-board, which is convex, or arched, in shape, and which at its edge is securely fastened to the inner rim. Over the sounding-board in turn is placed the full metal plate. The specific purpose of the latter is to hold the strings. The strings are drawn across the plate from the tuning-pins at its front end to hitch-pins at its rear—the positions of these pins being carefully determined with the object in view that the string tension, which equals a constant pressure of from forty to forty-five thousand pounds, may be nicely proportioned throughout. The action is then adjusted; and in such manner that a hammer, upon being brought into play by the depression of its key, shall strike a string, or unison, thus causing the latter to vibrate. Now, the strings, in being drawn from the front to the rear end of the plate, pass over or cross a bridge, known as the belly-bridge; and this bridge rests directly upon and is glued to the sounding-board. The proper height of the bridge is a delicate matter; if too high, the downward pressure of the strings overbalances the upward pressure exerted by the arched board; if too low, vice versa. There must be compensation. As the strings are set pulsating, or vibrating, by the hammer blows, the vibratory motion is communicated through the bridge to the sounding-board, and thereby amplified and re-enforced.

Of all the factors mentioned, not one surpasses in importance the sounding-board; for upon the character of the board depends in large degree the character of the tone. True, one of the world's great exponents of the art of pianoforte playing, the late Anton Rubinstein, declared: "The more I play, the more thoroughly I am convinced that the pedal is the soul of the pianoforte." Now, the pedal is a portion of the action, and it may be that Rubinstein was somewhat prejudiced; for being by nature anything but "static" the action to him bulked large! But others there are who declare the sounding-board to be the soul of the instrument, if we must use the term at all. And while it is true that without the action we could not produce the tone, the fact remains that were it not for the sounding-board the tone produced would amount to

little or nothing! However, suppose we leave it that they are both important; not only because every musical instrument may be divided into two parts—the tone-producing mechanism, and the tone-controlling mechanism—but also because, as the dear old lady said, “Comparisons are odorous”!

In any event, the board has commanded, since time out of mind, the earnest attention of engineer, acoustician, and scientific investigator. It is the board which supplies the resonance, and it is the resonance which vitalizes the sound, feeble enough in itself, generated by the strings. Without the resonant property of the board, no pianoforte tone, as such, would be possible; and since the arch, or crown, of the board is largely responsible for the board’s property of resonance, it becomes but axiomatic to state that the desirability, nay, the necessity of maintaining the arch is of paramount importance.

In order that the arch may be maintained, and maintained adequately, it is first of all essential that the sounding-board be securely fastened along the edge to the inner rim of the frame. In view of the constant pressure of the strings upon the board, via the bridge, and in view of devastating effects of climatic and atmospheric changes—changes ever imminent, and at times very real—even a strengthened, laminated, continuous rim (introduced fifty years or more ago and pretty generally used today) proved insufficient. A still further buttressing of the board—a desideratum of high importance—was yet to be achieved. Contrivances with this end in view have from time to time appeared (as, for instance, a system of screw compression, 1872, acting against the board’s entire edge), though they proved to be abortive. Of all attempts to solve the problem one alone has been successful.

Necessity is indeed the mother of invention. The difficulty was finally surmounted in the year 1900 by a device patented at the time and known as the Tension Resonator.<sup>1</sup> In referring to this invention, the *Scientific American*, of October 11, 1902, stated the following: .

<sup>1</sup> Note: The tension Resonator, invented and patented in 1900 by the Mason & Hamlin Co., is an outstanding feature in all Mason & Hamlin Grand Pianofortes.

"One imperfection in the modern pianoforte, found even in the instruments made by standard makers, has been the loss in tone quality, due to the inability of the sounding-board to retain its tension. The problem seems at last to have been satisfactorily solved by a most simple and ingenious construction. . . . Doubtless the question has presented itself to many of our readers, Why is it that a violin improves with age and that a piano deteriorates? A comparison of the construction of the sounding-boards of the two instruments will give a satisfactory explanation.

"The sounding-board of a violin has a permanent shape. The stiffening-post, which is inserted within the instrument directly beneath the bridge, where the greatest strain is exerted, connects the board with the back and thus prevents a rupture of the board at its weakest point. The tense strings and the vibrant board are a unit in themselves, the strain of the one counteracting the strain of the other.

"In the piano the case is different. The best pianos are provided with sounding-boards slightly arched, over which the strings extend. The strings being spread over the entire surface, must necessarily be on a straighter surface than is the case with the violin, where the four strings bear upon a very small part only of the sounding-board. Therefore the tremendous strain of the strings on a modern piano has the tendency from the first to force down the arch of the board. In the very finest and most expensive pianos when new, the strain of the arched board against the strings and the strain of the strings against the arched board, are so finely adjusted that the one counterbalances the other. That is to say, the sounding-board is able to carry the strain of the downward-bearing strings, and at the same time is pliable enough to yield to the slightest vibration of the strings. If the sounding-board is too stiff and heavy, only violent vibrations will affect it, and it will throw out only a blunt, dull sound. On the other hand, if the sounding-board cannot carry the strain of the strings properly there will not be the proper resistance, and the sound will be wiry and thin, 'tin-panny,' in other words. So sensitive is the wood to climatic changes that the piano sounding-board loses its shape very easily. Under certain conditions the sounding-board will expand, and the soft and hard fibres of the wood will be pressed together, which in itself results in no injury; under other conditions the sounding-board will contract so that it assumes a perfectly flat shape. Even if the board does not crack after contraction, as it often does, the loss of its original convex shape results in a great loss of tone, owing to the board's inability to bear against the strings as it once did. The result is a deterioration of tone in all pianos when old, no

matter how finely they sounded at one time. Since the loss of shape is permanent, the loss of tone is permanent.

"The wood being as good as it ever was, it follows that were there some means of restoring to the sounding-board its original convex form, so that it would bear upon the strings as it originally did, the tone would surely return. By means of the new construction, to which we have referred, not only is this much-desired end attained, but something more. The sounding-board bears with greater pressure and far more vitality against the strings than the necessarily thin sounding-board could in itself. This extra pressure against the strings, which the contracted board gets by means of tension resonator rods, is entirely different from the rigid stiffness of a too heavily constructed board, and by this method the musical quality of the instrument is much improved."

So much for the *Scientific American*. But the Tension Resonator possesses other virtues as well. It is, for instance, an undeniable means of unifying the various contributory tonal factors, of knitting into one complete whole the salient tone-producing elements of the structure.

Until approximately the year 1890 the universal custom had prevailed of so adjusting the bridge to the sounding-board that the grain in the wood of the former should run at right angles to the grain of the latter. But, in order to meet a growing demand for an increased tonal-volume capacity, it became necessary to somewhat alter the construction of the board. For an increase in tonal-volume prefigures the necessity of thicker or heavier strings, assuming, of course, that the string-lengths remain unchanged; while thicker strings, in turn, signify an increase in string tension. As a result, however, of intensive research it was at length determined, and empirically proven as well, that if the grain of the bridge runs as nearly parallel as possible to the grain of the board, while the grain of the re-enforcing ribs or bars on the reverse side of the board runs at right angles to the grain of the latter, and if a correct width, height, and tapering of the bars toward the board's interior area be obtained, it was determined, we say, that not only will the board be possessed of a greater strength than otherwise, but that its elasticity, also, will be preserved; and among the indispensable attributes of the board, strength and elasticity are foremost.

Furthermore, a greater string tension necessitates a higher bearing, as it is called, on the bridge, in order that the additional downward pressure of the strings may be adequately provided for. Hence it follows that the entire structure becomes subjected to an unprecedented strain. In the Tension Resonator form of construction ample provision for this strain is made.

Again, as a result of thus amply providing for this increased strain and its counterbalancing resistance, the sensitiveness of the instrument as a whole, as well as its capacity for endurance, becomes pronouncedly enhanced. Consequently, by virtue of the Tension Resonator, the resultant tone itself is highly sensitized; it is a tone of signal refinement; of a character purely musical, and it at all times *sings* as it bears its message to the lover of beauty.

Thus, since tone quality is the ultimate test of evaluation, or the criterion in accordance with which a pianoforte is to be judged, the Tension Resonator ranks in importance with the repetition action of 1821, the full metal plate of 1843, and the combination of the plate with the overstrung scale of 1859. It takes its place not only as the outstanding structural feature of the past fifty years, but also as an unique factor of progress in the never-ending evolution of the pianoforte at its best.

While up to this point we have concentrated in our remarks upon the most advanced type of pianoforte construction—as applying more particularly to the larger grands—we now turn to other, though kindred, considerations.

A department of the industry which during the past half century has claimed increasing attention is represented by the persistent attempt to produce an instrument of the “grand” type or shape which, though reduced in length, may still be in tone worthy of a place in the maker’s family to which it belongs. The incentive to produce such a grand—one under six feet in length, say—received early encouragement through the waning interest, on the part of the public as well as that of maker, in the now obsolete type of instrument known as the “square”—a type structurally defective be it said from the first. And although it is obviously impossible to obtain from a pianoforte under six feet in length

the tonal volume which characterizes a larger instrument, still a reassuring progress in this direction has manifestly been made. Today, various manufacturers are producing small grands which not only outrival those of less than even a generation ago, but which, in certain instances, are superior to many a larger grand. Their popularity, too, is in the ascendancy. Indeed, the small grand of today is constantly encroaching upon the territory not only of the larger size, but upon the territory also which was once under the exclusive control of the "upright"—the grand's whilom ally in the vanquishing of the "square"! So far as eye-appeal is concerned this is doubtless well; and furthermore, since the upright in its very form is more of a muffler than an amplifier of tone, the advent of the small grand may be doubly welcomed. It meets, too, a requirement more and more pronounced,—that of occupying less space than its larger and older relatives.

In still another department, as well, advance is very definitely to be noted, for the Graces no less than the Fates have not been unpropitious. Referring again to eye-appeal, a field of exceptional fertility has recently been that of case design and treatment.

Individuality and a constantly growing appreciation of the personal touch form the keynote today as never before in the furnishing of our homes. In the home of the discerning, the eye is to be satisfied no less than the ear. Much of our furniture, consequently, is faithfully representative in its pattern of the outstanding art periods of the past.

The pianoforte, which universally takes a prominent place in the homes of the land, should be in keeping with its environment, that it may not thwart this personal touch in the decorative scheme, but rather that it may lend an emphasis thereto. To this fact the piano maker is keenly awake, while his product, particularly of more recent years, attests his alertness. The artistic knowledge and likewise the ability of designing experts have here been called into play with the refreshing result that pianoforte cases, exquisite in form and appearance, architecturally trustworthy and symbolic of master designs conceived in past ages, have been the outcome. "It is a matter of interest to trace the revolution in the styles of domestic furniture," states the recent

catalogue of a leading manufacturer, "to learn the causes which underlie and explain the many apparently extraordinary changes in taste and design which have obtained in the various periods of the world's history. The best furniture produced today is, in its design, an adaptation of the best models of past centuries, changed and augmented to meet modern needs. Taste in furniture, as we all know, goes by fashion, and happily the present-day taste is for the finest examples of the 'Periods' in decorative design known as Louis XV, Louis XVI, Queen Anne, also the rich decorative quality of the Latin, Spanish, Florentine, and 18th Century Italian styles, and the charming simplicity of the Georgian, which embraces Sheraton, Chippendale, Hepplewhite, and its overseas prototype which we call Early American or Colonial. The latter has recently shown its right to a place in the highest reaches of decorative art in the superb examples of the work of Duncan Phyffe, an American furniture maker the equal of any of his celebrated European contemporaries. In the building and arranging of our home we give infinitive thought to its style—we employ experts to guide our taste in its building, and in furniture we bring all the knowledge we possess to making the home a place of beauty and charm. Such a home should contain a pianoforte which will carry out the personal touch and taste that are evidenced by its other furnishings. Such an instrument need not necessarily be very expensive. Delightful and distinctive instruments are to be had at a comparatively small advance over the cost of what may be termed 'regular models.' "

Notwithstanding the constantly increasing demand for these Period designs, however, there are many persons who still cling to the plainer, more conservative type. The maker realizes this and leaves undisturbed his "line," as it is called, of conventional cases.

But I must not overlook the sub-title in the caption of this paper—"With some figures." Accurate statistics are difficult to obtain; we are obliged to depend upon census figures of the Federal Government, inaccurate though they may be, for such information on production as is available. Even the National Piano Manufacturers' Association and the Music Industries Chamber

of Commerce, working directly for the interests of the manufacturer, are unable to secure uncolored reports regarding this matter. Such figures as we submit are not as complete in detail as might be wished; but approximately the number of pianofortes, both grand and upright, manufactured in the year 1876, was 30,382, and the value in dollars \$10,281,500. In the year 1925, the number of units increased to 321,639, and the proceeds to \$93,640,000, or in percentages the increase covering the period of practically 50 years, amounts to 958% as for units, and to 810% as to proceeds. According to advices from the Bureau of the Census its report for the year 1927 will be issued within a few weeks. Final figures are not, I regret to say, obtainable today. As for 1928, this much is clear: while a definite decrease is noticeable in the total production of units for the twelve months now drawing to a close, owing to a distinct falling-off in the manufacture of the cheap inferior grade of pianofortes, there is equally noticeable an accompanying increase, and very marked it is, in the demand for the high-grade or superior type of instrument. Indeed, during the past few years the pianoforte industry of the United States, which represents a turnover of approximately one hundred millions of dollars per annum, has, like many another, experienced a period of transition. This applies more definitely, to be sure, to the lower-price or so-called commercial pianoforte, which for various reasons has been face to face with an unusually formidable competition. The attractive and popularly priced automobile, the phonograph, the radio receiving-set, not to mention various labor-saving devices such as for instance, the mechanical refrigerator,—these and other commodities have allured the attention and the dollars of a considerable portion of the American public into new and engrossing channels. The lower-priced pianoforte has suffered, temporarily at least, in consequence. And yet at the same time, as the over-wrought emotions of a war-stirred people are gradually becoming more and more normal there is exhibited less and less interest in the feverish syncopation of jazz, while the one-time highly popular though crass ragtime-medleys are giving way to a more melodious music. Wholesome progress is reported also by the Committee on Instru-

mental Affairs of the Music Supervisors' National Conference as to group pianoforte classes in the public schools of the country. The Director of the National Bureau for the Advancement of Music recently stated at a meeting of the piano section of this committee that requests for its published "Guide" had been received from some 1500 cities and towns throughout the United States, thus indicating the widespread enthusiasm on the part of music-supervisors and school superintendents for pianoforte class work. Again, the growth in the appreciation of worthy music, and its cultivation, on the part of the American public during the past generation, is matter of common knowledge—notwithstanding certain lamentable conditions that exist as well.

Therefore, in view of these favorable facts, and others of like significance, are we not justified in being optimistic as to the future of the pianoforte—the musical instrument universal?

With this future constantly in mind, one of the largest and leading pianoforte concerns of the day is maintaining, as in fact it has for several years maintained, its own individual Research Laboratory; here, under the supervision of an eminent scientist, is represented an investment of thousands upon thousands of dollars. Investigation is continually going forward; at the present time, for example, thought is being concentrated not alone upon the further development and improvement of the pianoforte action, but likewise upon the science of tone itself.

In closing we refer once more to the inconsolable Miss Havisham and the havoc brought about by her *unnatural*, yet none the less pathetic, procedure; and if in the course of our remarks we have been able in any degree, "to point a moral, or adorn a tale," it is because of precisely this: that the betterment of the pianoforte has ever been, and still is, dependent upon *natural* laws; as more light is shed, further progress will be made, for the conscientious maker realizes that despite the high point of development at any one time attained, the ideal of perfection ever beckons him on. Thus sings the poet,

"Man's reach should exceed his grasp,  
Else what's a heaven for?"

